

Programmable DC Power Supplies 200W/400W/600W/800W in 2U Built-in USB, RS-232 & RS-485 Interface

Optional Interface: LAN
IEEE488.2 SCPI (GPIB) Multi-Drop
Isolated Analog Programming



TDK·Lambda

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Features Include:

- High Power Density 200W/400W/600W/800W in 2U: 3.5 Inch (89mm) height
- Wide Range Input (85-265Vac continuous)
- Active Power Factor Correction (0.99 typical)
- Output Voltage up to 650V, Current up to 5A
- Constant Voltage (CV)/(CC) Constant Current auto-crossover
- Built-in RS-232/RS-485 Interface Standard
- Global Commands for Serial RS-232/RS-485 Interface
- Auto-Re-Start / Safe-Start: user selectable
- Last-Setting Memory
- High Resolution 16 bit ADCs & DACs
- · Low Ripple & Noise
- Front Panel Lock selectable from Front Panel or Software
- · Reliable Encoders for Voltage and Current adjustment
- · Parallel Operation with Active Current Sharing, for up to six identical units
- Advanced Parallel Master / Slave. Total Current is programmed and measured via the Master
- External Analog Programming and Monitoring (user selectable 0-5V & 0-10V)
- Reliable Modular and SMT Design
- 19" Rack Mount Capability for ATE and OEM applications
- · Optional Interfaces

Isolated Analog Programming and Monitoring Interface (0-5V/0-10V & 4-20mA) IEEE 488.2 SCPI (GPIB) Multi-Drop

LAN

LabView® and LabWindows® drivers

• Arbitrary functions for:

Automotive or laser simulation / 4 Pre-Programmed Functions

- · Fast Command Processing Time
- · Output Sequencing
- Four-cell Memory Settings
- User Programmable Signal Pins
- Five Year Warranty
- Worldwide Safety Agency Approvals; CE Mark for LVD and EMC regulations





Front Panel Description





- 1. AC ON/OFF Switch
- 2. Air Intake allows zero stacking for maximum system flexibility and power density.*
- 3. Reliable encoder controls Output Voltage and power supply setting.
- 4. Volt Display shows Output Voltage and directly displays and power supply settings.
- 5. Reliable encoder controls Output Current, and power supply setting.
- 6. Current Display shows Output Current and power supply setting.
- 7. Function/Status LEDs:
- AlarmFine ControlPreview SettingsFoldback ModeRemote ModeOutput On
- 8. Pushbuttons allow flexible user configuration
- Coarse and Fine adjustment of Output Voltage/Current and Advanced Parallel Master or Slave
- Preview settings and set Voltage/Current with Output OFF, Front Panel Lockout
- · Set OVP, UVP, UVL Limits
- Set Current Foldback
- Local/Remote Mode and select Address and Baud Rate
- Output ON/OFF and Auto-Start/Safe-Start Mode
- Menu

^{*} Zero stacking - side-by-side mounting of 6 units in a 19" Rack

Rear Panel Description





- 1. Connector allows (Non-isolated) Analog Program and Monitor and other functions.
- 2. Remote/Local Output Voltage Sense Connections.
- 3. Signal Connector
- 4. RS-232/RS-485 INPUT Remote Serial Programming.
- 5. RS-485 OUTPUT to other Z⁺ Power Supplies.
- 6. USB Interface
- 7. Wide-Range Input 85-265VAC continuous, 47/63Hz with Active Power Factor Correction (0.99 typical) AC Input Connector: IEC320 -C16.
- 8. Exhaust air exits at the back. Allows vertical stacking of units without any separation between units
- 9. Output Connections:
 - MALE CONNECTOR (IC 2,5/4-G-5,08, PHOENIX CONTACT).
 - FEMALE PLUG (IC 2,5/4-ST-5,08, PHOENIX CONTACT).
- 10. Optional Interface Position for LAN Interface.
- 11. Optional Interface Position for GPIB Interface (shown) or Isolated Analog Interface.



***** Power Benchtop Parallel and Series Configurations

Benchtop Power Supply

Parallel operation - Master/Slave:

Active current sharing allows up to six identical units to be connected in an auto-parallel configuration for six times the output power.

In Advanced Parallel Master/Slave Mode, total current is programmed and reported by the Master, Up to six supplies act as one.



Series operation

Up to two units may be connected in series to increase the output voltage or to provide bipolar output.

Remote Programming via Built-in USB, RS-232 & RS-485 Interface

Standard Serial Interface allows daisy chain control of up to 31 power supplies on the same bus with built-in RS-232 & RS-485 Interface.

Optional Interface: LAN & IEEE488.2 SCPI (GPIB)

Multi-Drop

Allows LAN/IEEE Master to control up to 31 slaves over RS-485 daisy-chain Only the Master needs be equipped with LAN/IEEE Interface













Applications

 Z^{\dagger} series power supplies have been designed to meet the demands of a wide variety of applications.

Test and Measurement

Built-in Last-Setting memory based on Flash Memory no battery or capacitor backup. Simplifies test design and requirements.

Built-in RS-232/RS-485 gives maximum system flexibility along with 0-5V and 0-10V, selectable analog programming.

Wide range of available inputs allows testing of many different devices.

Semiconductor Burn-in

Safe-Start mode ENABLED - to re-start at Output OFF to protect load.

Wide range input (85-265Vac) with Active Power Factor correction rides through input transients easily.

Component Test

High power density, zero stacking and single wire parallel operation, give maximum system flexibility.

Laser Diode

OVP is directly set on Voltage Display, assuring accurate protection settings.

Fast Constant Current response, no over shoot. Current Limit Fold Back assures load is protected from current surges.

Heater Supplies

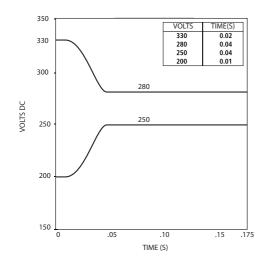
Smooth, reliable encoders enhance front panel control. Remote analog programming is user selectable 0-5V or 0-10V.

RF Amplifiers and Magnets

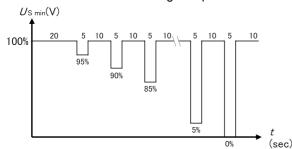
Robust design assures stable operation under a wide variety of loads. High linearity in Voltage & Current mode.

Z⁺ Series Sequence Programming Applications:

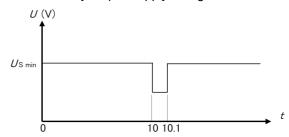
MILITARY STANDARD 704E Testing



Reset behaviour at voltage drop



Discontinuities in supply voltage Momentary drop in supply voltage



Options: (200W/400W/600W/800W)

Z⁺ Assemblies

Dual Output Housing (for 105mm) 200W/400W/600W/800W Triple Output Housing (for 70mm) 200W/400W/600W/800W P/N: Z-NL200 (same p/n for both Dual & Triple Output Housing)





19" Rack Mounted to 4.8kW

Six units (70mm) can be assembled into 19-Inch rack/2U high Four units (105mm) can be assembled into 19-Inch rack/2U high to meet your configuration requirements.

In cases where the entire rack is not occupied with power units, P/N: Z-BP for 70mm, P/N: Z-WBP for 105mm blank panels can be installed:

P/N: Z-NL100





Power Modules Table

Module Type	200W	400W	600W	800W
0~160V	1.3A	2.6A	4A	5A
0~320V	0.65A	1.3A	2A	2.5A
0~650V	0.32A	0.64A	1A	1.25A
19" rack width	1/6 width	1/6 width	1/6 width	1/6 width
19" rack width	1/4 width	1/4 width	1/4 width	1/4 width





Programming Options (Factory Installed)

Digital Programming via IEEE Interface

- IEEE 488.2 SCPI Compliant
- Program Voltage
- Measure Voltage
- Over Voltage setting and shutdown
- Error and Status Messages

- Program Current
- Measure Current
- Current Foldback shutdown

- Multi-Drop
- Allows IEEE Master to control up to 31 slaves over RS-485 daisy-chain
- Only the Master needs be equipped with IEEE Interface

Isolated Analog Programming

Four Channels to Program and Monitor Voltage and Current.

Isolation allows operation with floating references in harsh electrical environments.

Choose between programming with Voltage or Current.

Connection via removable terminal block: Phoenix MC1,5/8-ST-3.81.

Voltage Programming, user-selectable 0-5V or 0-10V signal.
 Power Supply Voltage and Current Programming Accuracy ±1%
 Power Supply Voltage and Current Monitoring Accuracy ±1.5%

Current Programming with 4-20mA signal.
 Power Supply Voltage and Current Programming Accuracy ±1%
 Power Supply Voltage and Current Monitoring Accuracy ±1.5%

P/N: IS510

P/N: IEEE

P/N: IS420

LAN Interface P/N: LAN

- VISA & SCPI Compatible
- Address Viewable on Front Panel
- Fixed and Dynamic Addressing
- Compatible with most standard Networks
- TCP / UDP Socket Programming
- LAN Fault Indicators
- Auto-detects LAN Cross-over Cable
- Fast Startup

AC Cord

Region	Europe	Japan	North America	Israel
Output Power	850W	850W	850W	850W
AC Cords	10A/250Vac L=2m	15A/125Vac L=2m	13A/125Vac L=2m	10A/250Vac L=2m
Wall Plug	INT'L 7/VII	JIS C8303	NEMA 5-15P	SI-32
Power Supply	IEC320-C15	IEC320-C15	IEC320-C15	IEC320-C15
Connector				
Part Number	P/N: Z-E	P/N: Z-J	P/N : Z-U	P/N: Z-I

Communication Cable

RS-232/RS-485 Cable is used to connect the power supply to the PC Controller

	· · · · · · · · · · · · · · · · · · ·	. ,
Mode	RS-485	RS-232
PC Connector	DB-9F	DB-9F
Communication Cable	Shield Ground L=2m	Shield Ground L=2m
Power Supply Connector	EIA/TIA-568A (RJ-45)	EIA/TIA-568A (RJ-45)
P/N	Z/485-9	Z/232-9

Serial Link Cable*

Daisy-chain up to 31 Z⁺ Series power supplies.

Mode	Power Supply Connector	Communication Cable	P/N
RS-485	EIA/TIA-568A (RJ-45)	Shield Ground	Z/RJ45

^{*} Included with power supply

Power Supply Identification / Accessories How to order

Z	650 -	1.25-	-	
Series Name	Output Voltage (0~650V)	Output Current (0~1.25A)	Factory Options:	AC cord Options: Region :
ranic	(0 0301)	(0 1.2371)	IEEE	E - Europe
			LAN	J - Japan
			IS510	U - North America
			IS420	I - Middle East
				C - China

Factory option
USB Interface built-in Standard
RS-232/RS-485 Interface built-in Standard
GPIB Interface
Voltage Programming Isolated Analog Interface
LAN Interface
LAN

Model	Output Voltage (VDC)	Output Current (A)	Output Power (W)	
Z160-1.3		0~1.3	208	
Z160-2.6	0~160 VDC	0~2.6	416	
Z160-4	0~160 VDC	0~4	640	Comming Soon
Z160-5		0~5	800	Comming Soon
Z320-0.65		0~0.65	208	
Z320-1.3	0~320 VDC	0~1.3	416	
Z320-2		0~2	640	Comming Soon
Z320-2.5		0~2.5	800	Comming Soon
Z375-2.2	0~375VDC	0~2.2	825	Comming Soon
Z650-0.32		0~0.32	208	
Z650-0.64	0~650 VDC	0~0.64	416	
Z650-1	U~030 VDC	0~1	650	Comming Soon
Z650-1.25		0~1.25	812	Comming Soon



2.1 Z⁺200 Series Specifications

MODEL	Z	160-1.3	320-0.65	650-0.32	
1. Rated output voltage(*1)	V	160	320	650	
2. Rated output current (*2)	A	1.3	0.65	0.32	
3. Rated output power	W	208	208	208	
CONSTANT VOLTAGE MODE	Z	160-13	320-0.65	650-0.32	
1. Max. Line regulation (*6)			0.01% of rated output voltage		
2. Max. Load regulation (*7)			0.01% of rated output voltage	ge	
3. Ripple and noise (p-p, 20MHz) (*14)	mV	100	150	250	
4. Ripple r.m.s. 5Hz~1MHz (*14)	mV	10	25	60	
5. Temperature coefficient	PPM/°0		PM/°C from rated output voltage, following		
6. Temperature stability			t over 8hrs. interval following 30 minutes w		
7. Warm-up drift		_	n 0.05% of rated output voltage over 30 mir		
8. Remote sense compensation/wire	V	5	5	5	
9. Up-prog. Response time, 0~Vomax.(*9)	mS	130	200	220	
	oad (*9) mS	180	270	270	
No Io	oad (*10) S	2	2.5	3	
11. Transient response time	mS		age to recover within 0.5% of its rated outp ut current. Output set-point: 10~100%, Loca		
12. Hold-up time (*19)			16mSec Typical.	15mSec Typical.	
CONSTANT CURRENT MODE	Z	160-1.3	320-0.65	650-0.32	
1. Max. Line regulation (*6)		0.0	2% of rated output current	0.15% of rated output current	
2. Max. Load regulation (*11)			0.09% of rated output curre		
3. Load regulation thermal drift			0.05% of rated output current over 30 minu		
4. Ripple r.m.s. 5Hz~1MHz (*12) (*14)	mA	1.2	0.8	0.5	
5. Temperature coefficient	PPM/°0		PM/°C from rated output current, following		
6. Temperature stability			er 8hrs. interval following 30 minutes warm		
7. Warm-up drift		Less than	+/-0.1% of rated output current over 30 mi	nutes following power on.	
PROTECTIVE FUNCTIONS	Z	160-1.3	320-0.65	650-0.32	
1. Foldback protection			when power supply change mode from CV recycle in autostart mode or by OUTPUT bu communication port.		
2. Over-voltage protection (OVP)		Inverter Shut down me	ethod. Reset by AC input recycle in autostar panel ENABLE, or by communicati		
3. Over -voltage trip point	V	5~176	5~353	5~717	
4. Output under voltage limit (UVL)			or communication port. Prevents from adju in analog programming.		
5. Output under voltage protection (UVP)		Output shut-down w	hen power supply output voltage goes belc recycle in autostart mode or by OUTPUT bu	ow UVP programming. User presetable. Itton or by rear panel ENABLE, or by	
		, ,	6. Over temperature protection User selectable, latched or non latched.		
		, ,	communication port. User selectable, latched or non la	atched.	
6. Over temperature protection			•	atched.	
6. Over temperature protection ANALOG PROGRAMMING AND MONITORING			User selectable, latched or non la		
6. Over temperature protection ANALOG PROGRAMMING AND MONITORING 1. Vout voltage programming		0~100%, 0~5	User selectable, latched or non la	nearity: +/-0.5% of rated Vout.	
6. Over temperature protection ANALOG PROGRAMMING AND MONITORING 1. Vout voltage programming 2. lout voltage programming (*13)		0~100%, 0~5 0~100%, 0~5	User selectable, latched or non la V or 0~10V, user selectable. Accuracy and li 5V or 0~10V, user selectable. Accuracy and	inearity: +/-0.5% of rated Vout. linearity: +/-1% of rated lout.	
6. Over temperature protection ANALOG PROGRAMMING AND MONITORING 1. Vout voltage programming 2. lout voltage programming (*13) 3. Vout resistor programming		0~100%, 0~5 0~100%, 0~ 0~100%, 0~5/10	User selectable, latched or non land the selectable of the selecta	inearity: +/-0.5% of rated Vout. linearity: +/-1% of rated lout. and linearity: +/-1% of rated Vout.	
6. Over temperature protection ANALOG PROGRAMMING AND MONITORING 1. Vout voltage programming 2. lout voltage programming 3. Vout resistor programming 4. lout resistor programming (*13)		0~100%, 0~5 0~100%, 0~5/10 0~100%, 0~5/10	User selectable, latched or non la V or 0~10V, user selectable. Accuracy and li 5V or 0~10V, user selectable. Accuracy and OKohm full scale, user selectable. Accuracy a	inearity: +/-0.5% of rated Vout. linearity: +/-1% of rated lout. and linearity: +/-1% of rated Vout. nd linearity: +/-1.5% of rated lout.	
6. Over temperature protection ANALOG PROGRAMMING AND MONITORING 1. Vout voltage programming 2. lout voltage programming (*13) 3. Vout resistor programming 4. lout resistor programming (*13) 5. Shut Off (SO) control		0~100%, 0~5 0~100%, 0~5/10 0~100%, 0~5/10	User selectable, latched or non land of the selectable of the sele	inearity: +/-0.5% of rated Vout. linearity: +/-1% of rated lout. and linearity: +/-1% of rated Vout. nd linearity: +/-1.5% of rated lout. ct, user selectable logic.	
6. Over temperature protection ANALOG PROGRAMMING AND MONITORING 1. Vout voltage programming 2. lout voltage programming 3. Vout resistor programming 4. lout resistor programming (*13) 5. Shut Off (SO) control 6. Output current monitor (*13)		0~100%, 0~5 0~100%, 0~5/10 0~100%, 0~5/10	User selectable, latched or non land to a control of the control o	inearity: +/-0.5% of rated Vout. linearity: +/-1% of rated lout. and linearity: +/-1% of rated Vout. nd linearity: +/-1.5% of rated lout. ct, user selectable logic. acy: +/-1%.	
6. Over temperature protection ANALOG PROGRAMMING AND MONITORING 1. Vout voltage programming 2. lout voltage programming (*13) 3. Vout resistor programming 4. lout resistor programming (*13) 5. Shut Off (\$O\$) control 6. Output current monitor (*13) 7. Output voltage monitor		0~100%, 0~5 0~100%, 0~5/10 0~100%, 0~5/10	User selectable, latched or non la V or 0~10V, user selectable. Accuracy and li 5V or 0~10V, user selectable. Accuracy and 0Kohm full scale, user selectable. Accuracy a Kohm full scale, user selectable. Accuracy a ctrical Voltage: 0~0.6V/4~15V or dry contac 0~5V or 0~10V, user selectable. Accur 0~5V or 0~10V, user selectable. Accur	inearity: +/-0.5% of rated Vout. linearity: +/-1% of rated lout. and linearity: +/-1% of rated Vout. nd linearity: +/-1.5% of rated lout. tt, user selectable logic. acy: +/-1%.	
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6. Over temperature protection ANALOG PROGRAMMING AND MONITORING 1. Vout voltage programming 2. lout voltage programming (*13) 3. Vout resistor programming (*13) 5. Shut Off (SO) control 6. Output current monitor (*13) 7. Output voltage monitor 8. Power supply OK signal 9. Parallel operation (*8)		0~100%, 0~5 0~100%, 0~ 0~100%, 0~5/10 0~100%, 0~5/10 By ele	User selectable, latched or non la V or 0~10V, user selectable. Accuracy and li 5V or 0~10V, user selectable. Accuracy and DKohm full scale, user selectable. Accuracy a Kohm full scale, user selectable. Accuracy a ctrical Voltage: 0~0.6V/4~15V or dry contac 0~5V or 0~10V, user selectable. Accur 0~5V or 0~10V, user selectable. Accur 4~5V-OK, 0V-Fail. 500ohm series re 6 units in master/slave mode with single w	inearity: +/-0.5% of rated Vout. linearity: +/-1% of rated lout. and linearity: +/-1% of rated Vout. nd linearity: +/-1.5% of rated lout. tt, user selectable logic. acy: +/-1%. acy: +/-1%. esistance. ire current balance connection.	
6. Over temperature protection ANALOG PROGRAMMING AND MONITORING 1. Vout voltage programming 2. lout voltage programming (*13) 3. Vout resistor programming (*13) 4. lout resistor programming (*13) 5. Shut Off (SO) control 6. Output current monitor (*13) 7. Output voltage monitor 8. Power supply OK signal 9. Parallel operation (*8) 10. Series operation		0~100%, 0~5 0~100%, 0~5 0~100%, 0~5/10 0~100%, 0~5/10 By ele	User selectable, latched or non la V or 0~10V, user selectable. Accuracy and li 5V or 0~10V, user selectable. Accuracy and DKohm full scale, user selectable. Accuracy a Kohm full scale, user selectable. Accuracy a ctrical Voltage: 0~0.6V/4~15V or dry contac 0~5V or 0~10V, user selectable. Accur 4~5V-OK, 0V-Fail. 500ohm series re 6 units in master/slave mode with single w 2 identical units (with external di	inearity: +/-0.5% of rated Vout. linearity: +/-1% of rated lout. and linearity: +/-1% of rated Vout. nd linearity: +/-1.5% of rated lout. rt, user selectable logic. racy: +/-1%. racy: +/-1%. sistance. rire current balance connection. iodes).	
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FRONT PANEL		
2. Display		Vout: 4 digits, accuracy: 0.5% of rated output voltage+/-1 count.
		lout: 4 digits, accuracy: 0.5% of rated output current+/-1 count.
2 Indications		GREEN LEDs: FINE, MENU, PREV, PROT, REM, OUTPUT, CV, CC
3. Indications	3. Indications	RED LED: PROT (OVP, UVP, OTP, FOLD, AC FAIL).
4. Function buttons		FINE, MENU, PREV, PROT, REM, OUTPUT

PROGRAMMING AND READBACK (RS232/485,USB, Optional: IEEE(*17), LAN)				
1. Vout programming accuracy		0.05% of actual + 0.05% of rated output voltage		
2. lout programming accuracy (*13)		0.2% of rated output current		
3. Vout programming resolution		0.012% of full scale		
4. lout programming resolution		0.012% of full scale		
5. Vout readback accuracy		0.05% of actual + 0.05% of rated output voltage		
6. lout readback accuracy (*13)		0.1% of actual +0.3% of rated output current		
7. Vout readback resolution		0.012% of full scale		

INPUT CHARACTERISTICS	Z	160-1.3	320-0.65	650-0.32
1. Input voltage/freq. (*3)		85~2	65Vac continuous, 47~63Hz, single	phase
2. Maximum Input current 100/200VAC (*4) (*15)		2.64/1.30	2.64/1.30	2.64/1.30
3. Power Factor (Typ)		>0.99 at 100Vac, >0.98 at 200Vac,100% load		
4. Efficiency (Typ) 100/200VAC (*4) (*15)	%	79/81	79/81	79/81
5. Inrush current 100/200VAC (*5)			Less than 25A	

ENVIRONMENTAL CONDITIONS		
1. Operating temperature		0~50°C, 100% load.
2. Storage temperature		-20~85°C
3. Operating humidity	%	20~90% RH (no condensation).
4. Storage humidity	%	10~95% RH (no condensation).
5. Altitude		Maximum 3000m. Derate ambient temp above 2000m.
5. Attitude		Operating: Maximum ambient temperature, From 2000m up to 3000m Ambient temperature 40°C.

SAFETY/EMC		
1. Applicable standards:	Safety	 UL61010-1, EN61010-1, IEC61010-1. Built to meet UL60950-1, EN60950-1 160V≤Vout≤650V: Output,J1,J2 are Hazardous. J3,J4,USB, IEEE/ISOLATED Analog ,LAN are Non Hazardous
	EMC	 IEC/EN61326-1 (Built to meet EN55022/EN55024)
		Output floating: Output, J1, J2 are Hazardous; J3, J4, USB, LAN, IEEE/ISOLATED ANALOG are Non Hazardous
2.Interface classification		Vout≤400V, +Output grounded: Output, J1, J2 are Hazardous; J3, J4, USB, LAN, IEEE/ISOLATED ANALOG are Non Hazardous
		Vout>400V, +Output grounded: Output, J1, J2, J3, J4, USB, LAN, IEEE/ISOLATED ANALOG are Hazardous
3. Withstand voltage		 160≤Vout≤320V models: Input-Output&J1,J2: 2970VDC/1min; Input-Ground: 2445VDC/1min. Output&J1,J2,-Ground: 1784VDC/1min; Output&J1,J2- J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 3028VDC/1min; Input-J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 4242VDC/1min; 3J,J4,USB,LAN/IEEE/ISOLATED ANALOG Input-Ground: 707VDC/1min. 650V model: Input-Output&J1,J2: 3704VDC/1min; Input-Ground: 2445VDC/1min. Output&J1,J2,-Ground: 2506VDC/1min; Output&J1,J2- J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 4242VDC/1min; Input-J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 4242VDC/1min; J3,J4,USB,LAN/IEEE/ISOLATDE ANALOG Input-Ground: 707VDC/1min.
4. Insulation resistance		 More than 100Mohm at 25°C, 70%RH.
5. Conducted emission		 IEC/EN61326-1 Industrial Location - B, FCC part 15-B, VCCI-B
6. Radiated emission		 IEC/EN61326-1 Industrial Location - A, FCC part 15-A, VCCI-A

MECHANICAL			
1. Cooling			Forced air cooling by internal fan.
STANDARD STANDARD		Kg	Less than 1.9Kg.
2. Weight	WIDE BODY	Kg	Less than 2.4Kg. Wide body with Isolated analog or IEEE.
3 Dimensions (Mallad)	STANDARD	mm	H: 83, W: 70, D: 350 (excluding bus bars, handles). (Refer to Outline drawing).
3. Dimensions (WxHxD)	WIDE BODY	mm	H: 83, W: 105, D: 350 (excluding bus bars, handles…). (Refer to Outline drawing).
4. Vibration			According to: IEC60068-2-64
5. Shock			Less than 20G, half sine, 11mS. Unit is unpacked. According to: IEC60068-2-27

NOTES:

- *1: Minimum voltage is guaranteed to maximum 0.1% of rated output voltage.
- *2: Minimum current is guaranteed to maximum 0.2% of rated output current.
- *3: For cases where conformance to various safety standards (UL, IEC, etc...) is required, to be described as 100-240Vac (50/60Hz).
- *4: Ta=25°C with rated output power.
- *5: Not including EMI filter inrush current, less than 0.2mSec at cold start Ta=25°C
- *6: At 85~132Vac or 170~265VAC, constant load.
- *7: From No-Load to Full-Load, constant input voltage. Measured at the sensing point in Remote Sense.
- *8: For parallel operation up to 4 units, 5% of total output current is required.
- For parallel operation more than 4 units, 20% of total output current is required. *9: From 10% to 90% or 90% to 10% of Rated Output Voltage, with rated resistive load.
- *10: From 90% to 10% of Rated Output Voltage.
- *11: For load voltage change, equal to the unit voltage rating, constant input voltage.
- *12: Ripple is measured at 10~100% of rated output voltage and rated output current.
- *13: The Constant Current programming, readback and monitoring accuracy do not include the warm-up and Load regulation thermal drift.
- *14: Measured with 10:1 probe.
- *15: P.S with Lan, IEEE, models decrease efficiency by 0.5% and increase input current by 0.5%.
 P.S with Isolated analog option decreases efficiency by 1.5% and increases input current by 1.5%.
- *16: At rated output power.
- *17: Max. ambient temperature for using IEEE is 45°C.



2.2 Z⁺400 Series Specifications

MODEL		Z	160-2.6	320-1.3	650-0.64		
1. Rated output voltage(*1)		V A	160	320	650		
2. Rated output current (*2)			2.6	1.3	0.64		
3. Rated output power		W	416	416	416		
CONSTANT VOLTAGE MODE		Z	160-2.6	320-1.3	650-0.64		
1. Max. Line regulation (*6)				0.01% of rated output voltage			
2. Max. Load regulation (*7)				0.01% of rated output voltage			
3. Ripple and noise (p-p, 20MHz) (*14)		mV	100	150	250		
4. Ripple r.m.s. 5Hz~1MHz (*14)		mV	10	25	60		
5. Temperature coefficient		PPM/°C	30PPM/°C from r	ated output voltage, following 30 r	minutes warm-up.		
6. Temperature stability			0.02% of rated Vout over 8hrs.	interval following 30 minutes warm	n-up. Constant line, load & temp.		
7. Warm-up drift			Less than 0.05% of ra	ated output voltage over 30 minute	s following power on.		
8. Remote sense compensation/wire		V	5	5	5		
9. Up-prog. Response time, 0~Vomax.(*9)		mS	80	150	150		
10. Down-prog. response time:	Full load (*9)	mS	100	150	150		
	No load (*10)	S	2	2.5	3		
44 7 1 1 1	, , ,		Time for output voltage to recover with	thin 0.5% of its rated output for a load c	hange 10~90% of rated output current.		
11. Transient response time		mS		set-point: 10~100%, Local sense. Less the			
12. Hold-up time (*19)				Typical.	15mSec Typical.		
12111old up time (12)				урган.	isinsee typican		
CONSTANT CURRENT MODE		Z	160-2.6	320-1.3	650-0.64		
1. Max. Line regulation (*6)			100 2.0	0.02% of rated output current	. 050 0.01		
2. Max. Load regulation (*11)				0.09% of rated output current			
3. Load regulation (*11)			Less than 0.050/ of rat	ed output current over 30 minutes	following load change		
				ed output current over 30 minutes			
4. Ripple r.m.s. 5Hz~1MHz (*12) (*14)		mA	1.5	I I	0.6		
5. Temperature coefficient		PPM/°C		rated output current, following 30	· · · · · · · · · · · · · · · · · · ·		
6. Temperature stability					. Constant line, load & temperature		
7. Warm-up drift			Less than +/-0.1% of I	rated output current over 30 minut	es tollowing power on.		
					1		
PROTECTIVE FUNCTIONS		Z	160-2.6	320-1.3	650-0.64		
1. Foldback protection				ower supply change mode from CV to CC mode or by OUTPUT button or by rear pa			
2. Over-voltage protection (OVP)				eet by AC input recycle in autostart panel ENABLE, or by communication			
3. Over -voltage trip point		V	5~176	5~353	5~717		
4. Output under voltage limit (UVL)				n port. Prevents from adjusting Vout below limit			
4. Output under voltage littlit (OVL)			, .	er supply output voltage goes below UVP			
5. Output under voltage protection (UVP)			Reset by AC input recycle in autostart	mode or by OUTPUT button or by rear pa	nel ENABLE, or by communication port.		
6. Over temperature protection			User selectable, latched or non latched.				
5. Output under voltage protection (UVP)				er supply output voltage goes below UVP mode or by OUTPUT button or by rear pa			
6. Over temperature protection			U	ser Selectable. Latched or non latch	ned		
ANALOG PROGRAMMING AND MONITO	RING						
	MING		0 1000/ 0 EV or 0 10V	user selectable. Accuracy and linea	ritury 1 / 0 E0/ of rated Voust		
1. Vout voltage programming				user selectable. Accuracy and linear, user selectable. Accuracy and line			
2. lout voltage programming (*13)							
3. Vout resistor programming				cale, user selectable. Accuracy and			
4. lout resistor programming (*13)				ale, user selectable. Accuracy and I			
5. Shut Off (SO) control			-	ge: 0~0.6V/4~15V or dry contact, u			
6. Output current monitor (*13)				or 0~10V, user selectable. Accuracy			
7. Output voltage monitor				or 0~10V, user selectable. Accuracy			
8. Power supply OK signal				V-OK, 0V-Fail. 500ohm series resist			
9. Parallel operation (*8)				aster/slave mode with single wire o			
10. Series operation			2	identical units (with external diode	es).		
11. CV/CC indicator				V mode: Off. Maximum voltage: 30			
12. Interlock (ILC) control				act (Short: On, Open: Off, Source current: less th			
13. Local/Remote mode Control				Open/Short: 0~0.6V or short: Remo			
14. Local/Remote mode Indicator				ener). On (0~0.6V, 10mA sink current			
				/, Minimum high level output =3.8\			
15.Trigger out			Maximur	n source current =16mA, pulse =20	μs Typical.		
16.Trigger in			Maximum low level input =1.2V, Minimum high level input =3.5V, Maximum high level input =5V, Maximum sink current =16mA, positive edge, trigger: tw =10μs minimum, Tr/Tf =1μs maximum.				
17. Programmed signal 1				Itage 25V, maximum sink current 1			
18. Programmed signal 2				Itage 25V, maximum sink current 1			
FRONT PANEL							
				Multiple options with 2 Encoders			
				Vout/lout manual adjust			
	ŀ			OVP/UVL /UVP manual adjust			
	ŀ		Protection F	Functions - OVP, UVL, UVP, Foldback	OCP INT. SO		
1. Control functions	}			inctions - Selection of LAN,IEEE (*20			
	}						
				ction Voltage/resistive programmir			
				ction Voltage/resistive programmir			
			Analog Control Functions - Selection	or vortage/Current Monitoring 5V/1	0V, Output ON/OFF, Front Panel Lock.		



FRONT PANEL	
3 Display	 Vout: 4 digits, accuracy: 0.5% of rated output voltage+/-1 count.
2. Display	 lout: 4 digits, accuracy: 0.5% of rated output current+/-1 count.
3. Indications	 GREEN LEDs: FINE, MENU, PREV, PROT, REM, OUTPUT, CV, CC
3. Indications	 RED LED: PROT (OVP, UVP, OTP, FOLD, AC FAIL).
4. Function buttons	 FINE, MENU, PREV, PROT, REM, OUTPUT

PROGRAMMING AND READBACK (RS232/485,USB, Optional: IEEE(*17), LAN)						
1. Vout programming accuracy		0.05% of actual + 0.05% of rated output voltage				
2. lout programming accuracy (*13)		0.2% of rated output current				
3. Vout programming resolution		0.012% of full scale				
4. lout programming resolution		0.012% of full scale				
5. Vout readback accuracy		0.05% of actual + 0.05% of rated output voltage				
6. lout readback accuracy (*13)		0.1% of actual +0.3% of rated output current				
7. Vout readback resolution		0.012% of full scale				
8. lout readback resolution		0.012% of full scale				

INPUT CHARACTERISTICS	Z	160-2.6	320-1.3	650-0.64
1. Input voltage/freq. (*3)		85~265Vac continuous, 47~63Hz, single phase		
2. Maximum Input current 100/200VAC (*4) (*15)		5/2.44	5/2.44	5/2.44
3. Power Factor (Typ)	0.99 at 100/200Vac,100% load			
4. Efficiency (Typ) 100/200VAC (*4) (*15)	%	84/86	84/86	84/86
5. Inrush current 100/200VAC (*5)		Less than 25A		

ENVIRONMENTAL CONDITIONS		
1. Operating temperature		0~50°C, 100% load.
2. Storage temperature		-20~85°C
3. Operating humidity	%	20~90% RH (no condensation).
4. Storage humidity	%	10~95% RH (no condensation).
5. Altitude		Maximum 3000m. Derate ambient temp above 2000m. Operating: Maximum ambient temperature, From 2000m up to 3000m Ambient temperature 40°C.

SAFETY/EMC					
1. Applicable standards:	Safety -		UL61010-1, EN61010-1, IEC61010-1. Built to meet UL60950-1, EN60950-1 160V≤Vout≤650V: Output,J1,J2 are Hazardous. J3,J4,USB, IEEE/ISOLATED Analog ,LAN are Non Hazardous		
	EMC IEC/EN61326-1 (Built to meet EN55022/EN55024)		IEC/EN61326-1 (Built to meet EN55022/EN55024)		
			Output floating: Output, J1, J2 are Hazardous; J3, J4, USB, LAN, IEEE/ISOLATED ANALOG are Non Hazardous		
2.Interface classification			Vout≤400V, +Output grounded: Output, J1, J2 are Hazardous; J3, J4, USB, LAN, IEEE/ISOLATED ANALOG are Non Hazardous		
			Vout>400V, +Output grounded: Output, J1, J2, J3, J4, USB, LAN, IEEE/ISOLATED ANALOG are Hazardous		
3. Withstand voltage			160≤Vout≤320V models: Input-Output&J1,J2: 2970VDC/1min; Input-Ground: 2445VDC/1min. Output&J1,J2;-Ground: 1784VDC/1min; Output&J1,J2- J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 3028VDC/1min; Input-J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 4242VDC/1min; J3,J4,USB,LAN/IEEE/ISOLATED ANALOG Input-Ground: 707VDC/1min. 650V model: Input-Output&J1,J2: 3704VDC/1min; Input-Ground: 2445VDC/1min. Output&J1,J2,-Ground: 2506VDC/1min; Output&J1,J2- J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 4016VDC/1min; Input-J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 4242VDC/1min; J3,J4,USB,LAN/IEEE/ISOLATDE ANALOG Input-Ground: 707VDC/1min.		
4. Insulation resistance			More than 100Mohm at 25°C, 70%RH.		
5. Conducted emission			IEC/EN61326-1 Industrial Location - B, FCC part 15-B, VCCI-B		
6. Radiated emission			IEC/EN61326-1 Industrial Location - A, FCC part 15-A, VCCI-A		

1. Cooling		Forced air cooling by internal fan.	
2. Weight STANDARD		Less than 1.9Kg.	
WIDE BODY	Kg	Less than 2.4Kg. Wide body with Isolated analog or IEEE.	
STANDARD	mm	H: 83, W: 70, D: 350 (excluding bus bars, handles). (Refer to Outline drawing).	
WIDE BODY	mm	H: 83, W: 105, D: 350 (excluding bus bars, handles…). (Refer to Outline drawing).	
4. Vibration		According to: IEC60068-2-64	
5. Shock		Less than 20G, half sine, 11mS. Unit is unpacked. According to: IEC60068-2-27	
	WIDE BODY STANDARD	WIDE BODY Kg STANDARD mm	

NOTES:

- *1: Minimum voltage is guaranteed to maximum 0.1% of rated output voltage.
- *2: Minimum current is guaranteed to maximum 0.2% of rated output current.
- *3: For cases where conformance to various safety standards (UL, IEC, etc...) is required, to be described as 100-240Vac (50/60Hz).
- *4: Ta=25°C with rated output power.
- *5: Not including EMI filter inrush current, less than 0.2mSec at cold start Ta=25°C
- *6: At 85~132Vac or 170~265VAC, constant load.
 *7: From No-Load to Full-Load, constant input voltage. Measured at the sensing point in Remote Sense.
- *8: For parallel operation up to 4 units, 5% of total output current is required.
 For parallel operation more than 4 units, 20% of total output current is required.
- *9: From 10% to 90% or 90% to 10% of Rated Output Voltage, with rated resistive load.
- *10: From 90% to 10% of Rated Output Voltage.
- *11: For load voltage change, equal to the unit voltage rating, constant input voltage.
- *12: Ripple is measured at 10~100% of rated output voltage and rated output current.
- *13: The Constant Current programming, readback and monitoring accuracy do not include the warm-up and Load regulation thermal drift.
- *14: Measured with 10:1 probe.
 *15: P.S with Lan, IEEE, models decrease efficiency by 0.25% and increase input current by 0.25%.
 P.S with Isolated analog option decreases efficiency by 0.75% and increases input current by 0.75%.
- *16: At rated output power.
- *17: Max. ambient temperature for using IEEE is 45°C.



2.1 Z⁺600 Series Specifications (Preliminary)

	-		-	<u> </u>	
OUTPUT RATING		Z	160-4	320-2	650-1
1.Rated output voltage (*1)		V	160	320	650
2.Rated output current (*2)		Α	4.0	2.0	1.00
3.Rated output power at 100≤Vin≤265Va	c, Ta ≤ 50°c	W	640	640	650
CONSTANT VOLTAGE MODE		Z	160-4	320-2	650-1
1. Max. Line regulation (*6)				0.01% of rated output voltage	
2. Max. Load regulation (*7)				0.01% of rated output voltage	
3. Ripple and noise (p-p, 20MHz) (*14) (*	17)	mV	100	150	250
4. Ripple and Hoise (p-p, 200112) (14) (4. Ripple r.m.s. 5Hz~1MHz (*14) (*17)	17)	mV	10	25	60
5. Temperature coefficient		PPM/°C		rated output voltage, following 30	
					·
6. Temperature stability				interval following 30 minutes warr	
7. Warm-up drift	-			ated output voltage over 30 minut	
8. Remote sense compensation/wire		V	5		
9. Up-prog. Response time, 0~Vomax.(*9)		mS	55	75	75
10. Down-prog. response time:	Full load (*9)	mS	65	85	85
	No load (*10)	S	2	2.5	3
11. Transient response time		mS		ver within 0.5% of its rated output f utput set-point: 10~100%, Local se	
12. Hold-up time (*15)			16m500	: Typical.	14mSec Typical.
12. Holu-up tillie (13)			I Iomsec	. Typical.	14msec Typical.
CONCTANT CURRENT MACRE		7	160.4	220.2	(50.1
CONSTANT CURRENT MODE		Z	160-4	320-2	650-1
1. Max. Line regulation (*6)				0.02% of rated output current	
2. Max. Load regulation (*11)				0.09% of rated output current	
3. Load regulation thermal drift			Less than 0.05% of rat	ed output current over 30 minutes	following load change.
4. Ripple r.m.s. 5Hz~1MHz (*12) (*14)		mA	2	1.5	1
5. Temperature coefficient		PPM/°C	100PPM/°C from	rated output current, following 30	minutes warm-up.
6. Temperature stability					. Constant line, load & temperature.
7. Warm-up drift				rated output current over 30 minut	
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			1 2033 (11011 17 0.17/0 011	acca bacpac carrein over 50 minu	es to to ming porter on.
PROTECTIVE FUNCTIONS		Z	160-4	320-2	650-1
PROTECTIVE FUNCTIONS					
1. Foldback protection			Output shut-down when power supply change mode from CV to CC or CC to CV. User presetable. Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port.		
2. Over-voltage protection (OVP)					ode or by OUTPUT button or by rear port.
3. Over -voltage trip point		V	5~176	5~353	5~717
					ng Vout below limit. Does not affect
4. Output under voltage limit (UVL) 5. Output under voltage protection (UVP)			in analog programming. Output shut-down when power supply output voltage goes below UVP programming. User presetable. Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by		
6. Over temperature protection			U	communication port. ser selectable, latched or non latch	ed.
			-		
ANALOG DROCRAMANING AND MONITO	DINC				
ANALOG PROGRAMMING AND MONITO	KING		0.4000/ 0.51/ 0.40/		
1. Vout voltage programming				user selectable. Accuracy and linea	
2. lout voltage programming (*13)			, user selectable. Accuracy and line		
3. Vout resistor programming				cale, user selectable. Accuracy and	
4. lout resistor programming (*13)				ale, user selectable. Accuracy and	
5. Shut Off (SO) control				ge: 0~0.6V/4~15V or dry contact, u	
6. Output current monitor (*13)			$0\sim5V$ or $0\sim10V$, user selectable. Accuracy: $+/-1\%$.		: +/-1%.
7. Output voltage monitor			0~5V or 0~10V, user selectable. Accuracy: +/-1%.		. / 10/
111/				V-OK, 0V-Fail. 500ohm series resis	
8. Power supply OK signal 9. Parallel operation (*8)			4~5		ance.
9. Parallel operation (*8)			4~5 Possible, up to 6 units in m	V-OK, 0V-Fail. 500ohm series resistants. Saster/slave mode with single wire	ance. current balance connection.
9. Parallel operation (*8) 10. Series operation			4~5 Possible, up to 6 units in m 2	V-OK, 0V-Fail. 5000hm series resist naster/slave mode with single wire identical units (with external diod	ance. current balance connection. es).
9. Parallel operation (*8) 10. Series operation 11. CV/CC indicator			4~5 Possible, up to 6 units in m 2 Open collector. CC mode: On, C	V-OK, 0V-Fail. 500ohm series resistater/slave mode with single wire identical units (with external diod V mode: Off. Maximum voltage: 3	cance. current balance connection. es). DV, maximum sink current: 10mA
9. Parallel operation (*8) 10. Series operation 11. CV/CC indicator 12. Interlock (ILC) control			4~5 Possible, up to 6 units in m 2 Open collector. CC mode: On, C Enables/Disables the PS output by dry conta	V-OK, 0V-Fail. 500ohm series resistater/slave mode with single wire identical units (with external diod V mode: Off. Maximum voltage: 3 ct (Short: On, Open: Off, Source current: less t	cance. current balance connection. es). DV, maximum sink current: 10mA nan 0.5mA). Ena/Dis is activated by front panel.
9. Parallel operation (*8) 10. Series operation 11. CV/CC indicator 12. Interlock (ILC) control 13. Local/Remote mode Control		 	4~5 Possible, up to 6 units in m 2 Open collector. CC mode: On, C Enables/Disables the PS output by dry conta By electrical signal or C	V-OK, 0V-Fail. 500ohm series resistater/slave mode with single wire identical units (with external diod V mode: Off. Maximum voltage: 3 ct (Short: On, Open: Off, Source current: less to Open/Short: 0~0.6V or short: Remo	cance. current balance connection. es). DV, maximum sink current: 10mA nan 0.5mA). Ena/Dis is activated by front panel. te, 2~15V or open: Local
9. Parallel operation (*8) 10. Series operation 11. CV/CC indicator 12. Interlock (ILC) control			4~5 Possible, up to 6 units in m 2 Open collector. CC mode: On, C Enables/Disables the PS output by dry conta By electrical signal or C Open collector (shunted by 36V ze	V-OK, 0V-Fail. 500ohm series resistater/slave mode with single wire identical units (with external diod V mode: Off. Maximum voltage: 3 ct (Short: On, Open: Off, Source current: less to Open/Short: 0~0.6V or short: Remoner). On (0~0.6V, 10mA sink current)	cance. current balance connection. es). DV, maximum sink current: 10mA han 0.5mA). Ena/Dis is activated by front panel. te, 2~15V or open: Local max.)-Remote. Off-Local (30V max.).
9. Parallel operation (*8) 10. Series operation 11. CV/CC indicator 12. Interlock (ILC) control 13. Local/Remote mode Control		 	4~5 Possible, up to 6 units in m 2 Open collector. CC mode: On, C Enables/Disables the PS output by dry conta By electrical signal or C Open collector (shunted by 36V ze Maximum low level output = 0.8\ Maximum	V-OK, 0V-Fail. 500ohm series resistater/slave mode with single wire identical units (with external diod IV mode: Off. Maximum voltage: 3 off. (Short: On, Open: Off, Source current: less to Open: Off. Off. Or short: Remoner). On (O~0.6V, 10mA sink current/, Minimum high level output = 3.8 on source current = 16mA, pulse = 20	cance. current balance connection. es). DV, maximum sink current: 10mA nan 0.5mA). Ena/Dis is activated by front panel. te, 2~15V or open: Local : max.)-Remote. Off-Local (30V max.). //, Maximum high level output =5V, thus Typical.
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Vout: 4 digits, accuracy: 0.5% of rated output voltage+/-1 cour	
	lout: 4 digits, accuracy: 0.5% of rated output current+/-1 count.
	GREEN LEDs: FINE, MENU, PREV, PROT, REM, OUTPUT, CV, CC
	RED LED: PROT (OVP, UVP, OTP, FOLD, AC FAIL).
	FINE, MENU, PREV, PROT, REM, OUTPUT

PROGRAMMING AND READBACK (RS232/485,	USB, Optional: IEEE (* 16	,, ,				
Vout programming accuracy		0.05% of actual + 0.05% of rated output voltage				
2. lout programming accuracy (*13)		0.2% of rated output current				
3. Vout programming resolution		0.012% of full scale				
4. lout programming resolution		0.012% of full scale				
5. Vout readback accuracy		0.05% of actual + 0.05% of rated output voltage				
6. lout readback accuracy (*13)		0.1% of actual +0.3% of rated output current				
7. Vout readback resolution		0.012% of full scale				
INPLIT CHARACTERISTICS	7	160-4	320-2	650-1		

INPUT CHARACTERISTICS	Z	160-4	320-2	650-1
1. Input voltage/freq. (*3)		85~265Vac continuous, 47~63Hz, single phase		
2. Maximum Input current 100/200VAC (*4)		7.5/3.7	7.5/3.7	7.6/3.8
3. Power Factor (Typ)		>0.99 at 100Vac, >0.98 at 200Vac,100% load		
4. Efficiency (Typ) 100/200VAC (*4)	%	86.5/88.5	87/89	87/89
5. Inrush current 100/200VAC (*5)		Less than 30A		

ENVIRONMENTAL CONDITIONS		
1. Operating temperature		0~50°C, 100% load.
2. Storage temperature		-20~85°C
3. Operating humidity	%	20~90% RH (no condensation).
4. Storage humidity	%	10~95% RH (no condensation).
5. Altitude		Maximum 3000m. Derate ambient temp above 2000m. Operating: Maximum ambient temperature, From 2000m up to 3000m Ambient temperature 40°C.

SAFETY/EMC			
1. Applicable standards:	Safety	 UL61010-1, EN61010-1, IEC61010-1. Built to meet UL60950-1, EN60950-1 160V≤Vout≤650V: Output,J1,J2 are Hazardous. J3,J4,USB, IEEE/ISOLATED Analog ,LAN are Non Hazardous	
	EMC	 IEC/EN61326-1 (Built to meet EN55022/EN55024)	
		Output floating: Output, J1, J2 are Hazardous; J3, J4, USB, LAN, IEEE/ISOLATED ANALOG are Non Hazardous	
2.Interface classification		Vout≤400V, +Output grounded: Output, J1, J2 are Hazardous; J3, J4, USB, LAN, IEEE/ISOLATED ANALOG are Non Hazardous	
		Vout>400V, +Output grounded: Output, J1, J2, J3, J4, USB, LAN, IEEE/ISOLATED ANALOG are Hazardous	
3. Withstand voltage		 160≤Vout≤320V models: Input-Output&J1,J2: 2970VDC/1min; Input-Ground: 2445VDC/1min. Output&J1,J2,-Ground: 1784VDC/1min; Output&J1,J2- J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 3028VDC/1min; Input-J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 4242VDC/1min; 3J.J4,USB,LAN/IEEE/ISOLATDE ANALOG Input-Ground: 707VDC/1min. 650V model: Input-Output&J1,J2: 3704VDC/1min; Input-Ground: 2445VDC/1min. Output&J1,J2,-Ground: 2506VDC/1min; Output&J1,J2- J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 4242VDC/1min; Input-J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 4242VDC/1min; J3,J4,USB,LAN/IEEE/ISOLATDE ANALOG Input-Ground: 707VDC/1min.	
4. Insulation resistance		 More than 100Mohm at 25°C, 70%RH.	
5. Conducted emission		 IEC/EN61326-1 Industrial Location - B, FCC part 15-B, VCCI-B	
6. Radiated emission -		 IEC/EN61326-1 Industrial Location - A, FCC part 15-A, VCCI-A	

MECHANICAL			
1. Cooling			Forced air cooling by internal fan.
STANDARD		Kg	Less than 2Kg
2. Weight	WIDE BODY	Kg	Less than 2.5Kg. Wide body with isolated analog or IEEE
2 Dimensions (Mallad)	STANDARD	mm	H: 83, W: 70, D: 350 (excluding bus bars, handles). (Refer to Outline drawing).
3. Dimensions (WxHxD) WIDE BODY		mm	H: 83, W: 105, D: 350 (excluding bus bars, handles…). (Refer to Outline drawing).
4. Vibration			According to: IEC60068-2-64
5. Shock			Less than 20G, half sine, 11mS. Unit is unpacked. According to: IEC60068-2-27

NOTES:

- *1: Minimum voltage is guaranteed to maximum 0.1% of rated output voltage.
- *2: Minimum current is guaranteed to maximum 0.2% of rated output current.
- *3: For cases where conformance to various safety standards (UL, IEC, etc...) is required, to be described as 100-240Vac (50/60Hz).

 *4: Ta=25°C with rated output power.

 *5: Not including EMI filter inrush current, less than 0.2mSec.

- *6: At 85~132Vac or 170~265VAC, constant load.
- *7: From No-Load to Full-Load, constant input voltage. Measured at the sensing point in Remote Sense.
- *8 For Parallel operation up to 4 units, 5% of total output current is required.
 - For Parallel operation more than 4 units, 20% of total output current is requierd.
- *9: From 10% to 90% or 90% to 10% of rated output voltage, with rated resistive load. *10: From 90% to 10% of rated output voltage.
- *11: For load voltage change, equal to the unit voltage rating, constant input voltage.
- *12: Ripple is measured at 10~100% of rated output voltage and rated output current.
- *13: The Constant Current programming, readback and monitoring accuracy do not include the warm-up and Load regulation thermal drift.
- *14: Measured with 10:1 probe.
- *15:At rated output power.
- *16 Max. ambient temperature for using IEEE is 45°C. *17: start in low ambient temp. (0°C), 1 min. warm up is required



2.1 Z⁺800 Series Specifications (Preliminary)

OUTPUT RATING	Z	160-5	320-2.5	375-2.2	650-1.25
1.Rated output voltage (*1)	V	160	320	375	650
2.Rated output current (*2) at 100≤Vin≤265Vac, Ta ≤ 50°c	А	5.0	2.5	2.2	1.25
Rated output current (*2) at 85≤Vin<100Vac, Ta ≤ 40°c		5.0	2.5	2.2	1.25
Rated output current (*2) at $85 \le Vin < 100 Vac$, 40 °c $< Ta \le 50$ °c		4.7	2.35	2.0	1.15
B.Rated output power at 100≤Vin≤265Vac, Ta ≤ 50°c	W	800	800	825	812.5
Rated output power at 85≤Vin<100Vac, Ta ≤ 40°c		800	800	825	812.5
Rated output power at 85≤Vin<100Vac, 40°c < Ta ≤ 50°c		752	752	750	747.5

CONSTANT VOLTAGE MODE	Z	160-5	320-2.5	375-2.2	650-1.25		
1. Max. Line regulation (*6)			0.01% of rated output voltage				
2. Max. Load regulation (*7)			0	0.01% of rated output voltage			
3. Ripple and noise (p-p, 20MHz) (*14) (*1	7)	mV	100	150	150	250	
4. Ripple r.m.s. 5Hz~1MHz (*14) (*17)		mV	10	25	25	60	
5. Temperature coefficient		PPM/°C	30PPM/	°C from rated output volta	ge, following 30 minutes w	/arm-up.	
6. Temperature stability			0.02% of rated Vout or	ver 8hrs. interval following	30 minutes warm-up. Cons	stant line, load & temp.	
7. Warm-up drift			Less than 0.05% of rated output voltage over 30 minutes following power on.				
8. Remote sense compensation/wire		V	5	5	5	5	
9. Up-prog. Response time, 0~Vomax.(*9)		mS	45	55	55	55	
10. Down-prog. response time:	Full load (*9)	mS	55	65	65	65	
	No load (*10)	S	2	2.5	2.5	3	
11. Transient response time		mS	Time for output voltage to recover within 0.5% of its rated output for a load change 10~90% of rated output current. Output set-point: 10~100%, Local sense Less than 2mS.				
12. Hold-up time (*15)		mS	13msec Typical.		11.5msec Typical.		

CONSTANT CURRENT MODE	Z	160-5	320-2.5	375-2.2	650-1.25		
1. Max. Line regulation (*6)			0.02% of rated output current				
2. Max. Load regulation (*11)			0.09% of rated output current				
3. Load regulation thermal drift		Less than 0.05% of rated output current over 30 minutes following load change.					
4. Ripple r.m.s. 5Hz~1MHz (*12) (*14)	mA	2 1.5 1.5 1					
5. Temperature coefficient	PPM/°C	100PPM/°C from rated output current, following 30 minutes warm-up.					
6. Temperature stability		0.05% of rated lout over 8hrs. interval following 30 minutes warm-up. Constant line, load & temperature.					
7. Warm-up drift		Less than +/-	-0.1% of rated output curre	nt over 30 minutes followi	ng power on.		

DROTECTIVE FUNCTIONS	7	160.5	320.25	275.2.2	650.1.25	
PROTECTIVE FUNCTIONS	Z	160-5	320-2.5	375-2.2	650-1.25	
		Output shut-down when power supply change mode from CV to CC or CC to CV. User presetable.				
1. Foldback protection		Reset by AC input rec	ycle in autostart mode or b	y OUTPUT button or by re	ar panel ENABLE, or by	
	communication port.					
2. Over-voltage protection (OVP)		Inverter Shut down method. Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port.				
3. Over -voltage trip point	V	5~176	5~353	5~413	5~717	
4. Output under voltage limit (UVL)		Preset by front panel or communication port. Prevents from adjusting Vout below limit. Does not affect in analog programming.				
5. Output under voltage protection (UVP)			Output shut-down when power supply output voltage goes below UVP programming. User presetab Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port.			
6. Over temperature protection		User selectable, latched or non latched.				

ANALOG PROGRAMMING AND MONITORING	
1. Vout voltage programming	 0~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-0.5% of rated Vout.
2. lout voltage programming (*13)	 0~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-1% of rated lout.
3. Vout resistor programming	 0~100%, 0~5/10Kohm full scale, user selectable. Accuracy and linearity: +/-1% of rated Vout.
4. lout resistor programming (*13)	 0~100%, 0~5/10Kohm full scale, user selectable. Accuracy and linearity: +/-1.5% of rated lout.
5. Shut Off (SO) control	 By electrical Voltage: 0~0.6V/4~15V or dry contact, user selectable logic.
6. Output current monitor (*13)	 0~5V or 0~10V, user selectable. Accuracy: +/-1%.
7. Output voltage monitor	 0~5V or 0~10V, user selectable. Accuracy: +/-1%.
8. Power supply OK signal	 4~5V-OK, 0V-Fail. 500ohm series resistance.
9. Parallel operation (*8)	 Possible, up to 6 units in master/slave mode with single wire current balance connection.
10. Series operation	 2 identical units (with external diodes).
11. CV/CC indicator	 Open collector. CC mode: On, CV mode: Off. Maximum voltage: 30V, maximum sink current: 10mA
12. Interlock (ILC) control	 Enables/Disables the PS output by dry contact (Short: On, Open: Off, Source current: less than 0.5mA). Ena/Dis is activated by front panel.
13. Local/Remote mode Control	 By electrical signal or Open/Short: 0~0.6V or short: Remote, 2~15V or open: Local
14. Local/Remote mode Indicator	 Open collector (shunted by 36V zener). On (0~0.6V, 10mA sink current max.)-Remote. Off-Local (30V max.).
15.Trigger out	 Maximum low level output =0.8V, Minimum high level output =3.8V, Maximum high level output =5V, Maximum source current =16mA, pulse =20µs Typical.
16.Trigger in	 Maximum low level input =1.2V, Minimum high level input =3.5V, Maximum high level input =5V, Maximum sink current =16mA, positive edge, trigger: tw =10µs minimum, Tr/Tf =1µs maximum.
17. Programmed signal 1	 Open collector, maximum voltage 25V, maximum sink current 100mA. (Shunted by 27V zener)
18. Programmed signal 2	 Open collector, maximum voltage 25V,maximum sink current 100mA. (Shunted by 27V zener)



FRONT PANEL									
THOMTTANLL			l		Multiple ention	with 2 Encodors			
				Multiple options with 2 Encoders Vout/lout manual adjust					
						manual adjust			
				Dr			· (n		
1. Control functions				Protection Functions - OVP, UVL, UVP, Foldback, OCP, INT, SO Communication Functions - Selection of LAN, IEEE (*17), RS232, RS485, USB					
				Communication Functions - Selection of Baud Rate, Address					
					Analog Control Functions - Selection Voltage/resistive programming, 5V/10V, 5K/10K programming				
					nalog Control Functions - Selection of Voltage/Current Monitoring 5V/10V, Output ON/OFF, Front Panel Lock.				
					: 4 digits, accuracy: 0.5% of				
2. Display					4 digits, accuracy: 0.5% of				
					REEN LEDs: FINE, MENU, PRE				
3. Indications				Gi		VP, OTP, FOLD, AC FAIL).	7, CC		
4. Function buttons						PROT, REM, OUTPUT			
1.1 direction bactoris			l		THILL, MENO, THEV,	THO I, HEN, GOTT OT			
PROGRAMMING AND READ	DBACK (RS2	32/485,USB, Op	tional: IEEE	(*16), LAN)					
1. Vout programming accura						of rated output voltage			
2. lout programming accura						output current			
3. Vout programming resolu						f full scale			
4. lout programming resolu	tion					f full scale			
5. Vout readback accuracy						of rated output voltage			
6. lout readback accuracy (*						of rated output current			
7. Vout readback resolution					0.012% o	f full scale			
INPUT CHARACTERISTICS			Z	160-5	320-2.5	375-2.2	650-1.25		
1. Input voltage/freq. (*3)					85~265Vac continuous	, 47~63Hz, single phase			
2. Maximum Input current 1	00/200VAC	(*4)		9.35/4.59	9.35/4.59	9.58/4.7	9.44/4.64		
3. Power Factor (Typ)	00/2001/10	('/		71337 1137		at 200Vac, 100% load	J. 1. 1, 110 1		
4. Efficiency (Typ) 100/200V	/AC (*4)		%	86.5/89 86.5/89 87/89.5 87/89.5					
5. Inrush current 100/200VA				00.5707		an 30A	0770313		
	- (- /								
ENVIRONMENTAL CONDITI	IONS								
1. Operating temperature					0~50°C, 1	00% load.			
2. Storage temperature					-20~	85°C			
3. Operating humidity			%		20~90% RH (no	condensation).			
4. Storage humidity			%			condensation).			
5. Altitude					Maximum 3000m. Derate a				
				Operating: Maximum	ambient temperature, Fron	1 2000m up to 3000m Ami	bient temperature 40°C.		
SAFETY/EMC		Ι	1	LII 61010	-1, EN61010-1, IEC61010-1.	Puilt to most III 60050 1 I	N60050 1		
1. Applicable standards:		Safety			t,J1,J2 are Hazardous. J3,J4				
		EMC		outpu		meet EN55022/EN55024)	, a. c o a.		
				Output floating: Output			NALOG are Non Hazardous		
2.Interface classification				Output floating: Output, J1, J2 are Hazardous; J3, J4, USB, LAN, IEEE/ISOLATED ANALOG are Non Hazardous Vout≤400V, +Output grounded: Output, J1, J2 are Hazardous; J3, J4, USB, LAN, IEEE/ISOLATED ANALOG are Non Hazardous					
					ounded: Output, J1, J2, J3, J				
					V models: Input-Output&J1,J2:				
				Output&J1,J2,-Ground:	1784VDC/1min; Output&J1,J2	J3,J4,USB,LAN/IEEE/ISOLATED	ANALOG :3028VDC/1min;		
					ATED ANALOG: 4242VDC/1min; J3,				
3. Withstand voltage					del: Input-Output&J1,J2: 3704V				
				Output&J1,J2,-Ground:	2506VDC/1min; Output&J1,J2- Input-J3,J4,USB,LAN/IEEE/ISOL	J3,J4,USB,LAN/IEEE/ISOLATED / ΔΤΕΝ ΔΝΔΙ ΝG: 4242VNC/1mir	ANALOG:4016VDC/1min;		
				J3	J4,USB,LAN/IEEE/ISOLATDE ANA				
4. Insulation resistance			More than 100Mohm at 25°C, 70%RH.						
5. Conducted emission				IEC/EN61326-1 Industrial Location - B, FCC part 15-B, VCCI-B					
6. Radiated emission				IEC/EN61326-1 Industrial Location - A, FCC part 15-A, VCCI-A					
						, p 9			
MECHANICAL			1	1					
1. Cooling			Forced air cooling by internal fan.						
2. Weight		NDARD	Kg	Less than 2Kg					
2. Treigitt	WID	E BODY	Kg		ess than 2.5Kg. Wide body	with isolated analog or IE	EE		
3. Dimensions (WxHxD)	STA	NDARD	mm		D: 350 (excluding bus bars,				
ס. טוווופוואוטווא (WXHXD)	WID	E BODY	mm	H: 83, W: 105	, D: 350 (excluding bus bars		tline drawing).		
4. Vibration				According to: IEC60068-2-64					
5. Shock				Less than 20G, half sine, 11mS. Unit is unpacked. According to: IEC60068-2-27					

- NOTES: *1: Minimum voltage is guaranteed to maximum 0.1% of rated output voltage.
- *2: Minimum current is guaranteed to maximum 0.2% of rated output current.
 *3: For cases where conformance to various safety standards (UL, IEC, etc...) is required, to be described as 100-240Vac (50/60Hz).

- *3: For cases where conformance to various safety standards (UL, IEC, etc...) is required, to be described as 100-240Vac (50/60Hz).

 *4: Ta=25°C with rated output power.

 *5: Not including EMI filter inrush current, less than 0.2mSec.

 *6: At 85~132Vac or 170~265VAC, constant load.

 *7: From No-Load to Full-Load, constant input voltage. Measured at the sensing point in Remote Sense.

 *8 For Parallel operation up to 4 units, 5% of total output current is required.

 For Parallel operation more than 4 units, 20% of total output current is requierd.

 *9: From 10% to 90% or 90% to 10% of rated output voltage, with rated resistive load.

 *10: From 90% to 10% of frated output voltage.

 *11: For load voltage change, equal to the unit voltage rating, constant input voltage.

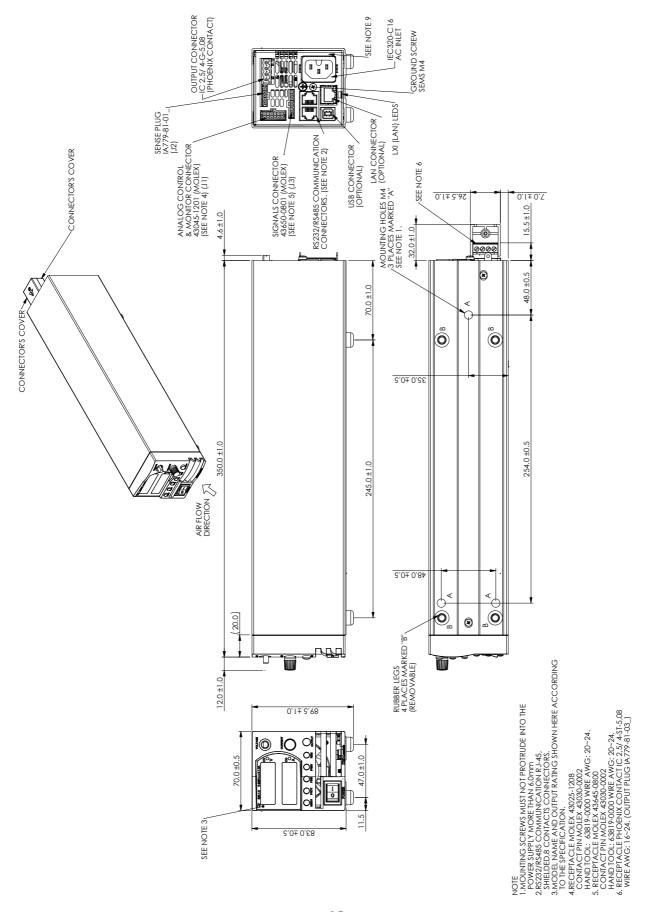
 *12: Ripple is measured at 10~100% of rated output voltage and rated output current.

 *13: The Constant Current programming, readback and monitoring accuracy do not include the warm-up and Load regulation thermal drift.

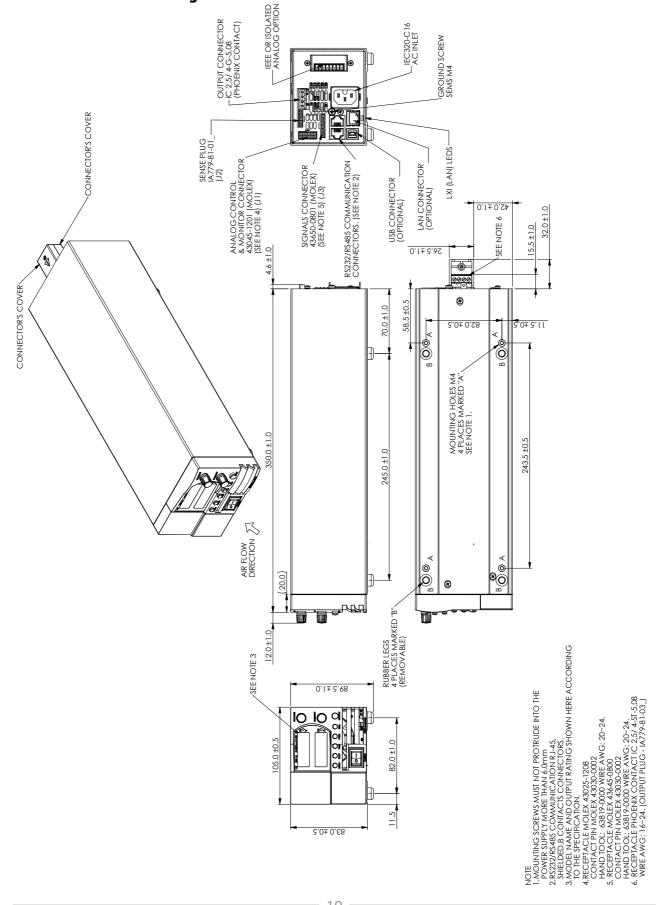
 *14: Measured with 10:1 probe.

 *15: At rated output power.
- *15:At rated output power.
- *16 Max. ambient temperature for using IEEE is 45°C.
- *17: start in low ambient temp. (0°C), 1 min. warm up is required

2.6 Z200W/400W/600W/800W Outline Drawing



2.7 Z200W/400W/600W/800W Optional IEEE, Isolated Analog Interface Outline Drawing



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